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(54) FLEXIBLE LADDER WITH SUPPORTING ACCESSORY

(57) The current invention discloses a rope ladder with supporting attachments, comprising a ladder hook (1) for the ladder to be hanged in a building, a rope ladder body fixed to said hook (1) made of a left and a right ladder belt (2) and multiple aluminum alloy strip rungs (3) spanning the two rope ladder belts, and supporting attachments (4) symmetrically fixed on back of the two ladder belts (2) at joints with the rungs (3). Said supporting attachments (4) is of a folding design with torsion springs, torsion force of which makes the supporting attachments (4) open outward automatically until the inner angle between them and the rungs (3) is a little bit larger than 90 degrees, so as to overcome difficulties people encounter to step on the rumps owing to closeness of the two ladder belts to building walls. When the current invention, the rope ladder, is in use, its supporting attachments are supported in building walls, there is a suitable space between the rungs (3) and building walls, making it easy and reliable for people to step on.

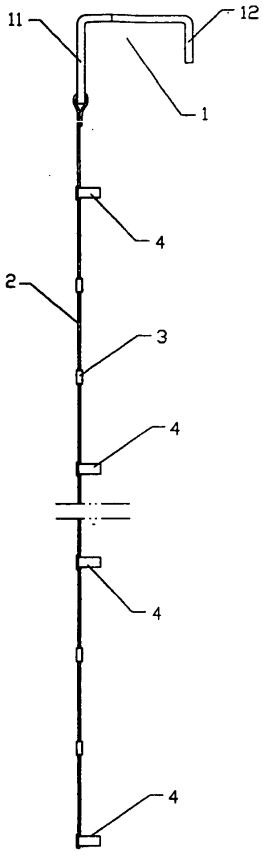

Fig. 2

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Description

FIELD OF INVENTION

[0001] This invention is directed to a rope ladder, especially a rope ladder for emergency escape in accidents.

BACKGROUND OF THE INVENTION

[0002] Most of rope ladders widely used now are made of soft textile belt sewed together. When people step on them, they are easy to twist and deform, and the ladders usually hang closely to buildings with only a narrow gap between the building and rope ladder, making people difficult to step on the ladder rumps. Their use is not easy, especially in emergencies, and valuable time for escape might be lost owing to such difficulty.

BRIEF SUMMERY OF THE INVENTION

[0003] The current invention is aimed to provide a rope ladder with support attachments that is reliable and easy for people to step on.

[0004] Aim of the current invention can be realized by the following technical plan. Design a rope ladder that has support attachments, which comprises a ladder hook used to hang the ladder in a building, a rope ladder body, fixed to the hook, made of left and right ladder belts, and multiple ladder rungs spanning the two ladder belts. Supporting attachments are fixed onto the back of said ladder belts symmetrically, and such supporting attachments are fixed to the joints of said ladder belts and rungs. In this design, rope and building are separated by such attachments to provide a space for users to step on rungs of said ladder.

[0005] Said supporting attachment is of a folding design, comprising a base strip fixed to joints of said rung with said rope belts, a supporting strip articulated to said base strip by way of a pivot pin. Said pivot pin is inside a torsion spring, the torsion force of which forced said supporting strip open outward automatically until its inner bottom projection is in contact with small bosses on said base strip. Said supporting strip will form an internal angle a little bit larger than 90 degree to said rung of the rope ladder. Such an angle will not cause said supporting strip to lose its supporting function owing to its closure to said rung when people step on said rung. As said supporting strips are of a folding design, they can be closed in case that the rope ladder is coiled, thus reducing space for storage. When the rope ladder is in use, supporting strips of said supporting attachments will be opened automatically by function of said torsion springs.

[0006] Said rope ladder hook comprises a U-shaped hook body and two L-shaped hooks, one is the left and the other is right. Correspondingly, said U-shaped hook body has a left and a right second horizontal bar located at ends of its two vertical bars, pointing to the back. In each of the left and right first horizontal bars of said L-shaped hooks, there are two bolts fixed and in each of the second horizontal bars of said hook body, there is a row of through holes for adjustment of space between said rope ladder and building, to which said rope ladder will be hanged. After said two bolts in each first horizontal bar of said L-shaped hook are inserted into holes in the second horizontal bars of said hook body, butterfly nuts are screwed onto the bolts. Width of rope ladder can be adjusted as required to adapt to different width of building walls or any other structures to which the rope ladder is hanged.

[0007] Said supporting attachments can be either assembled onto each joint of the rope ladder belts with rungs, or assembled in pairs per three or four rungs in equal spacing.

[0008] In order to avoid deformation of the rope ladder once people step on the rungs, said rungs are made of aluminum alloy strips inside with fire-retardant textile cloth wrapped on.

[0009] Compared with the existing technology, the current invention of rope ladder with supporting attachments have the following advantages: the ladder can maintain a suitable space from building walls or any other structure it hang on, thus facilitating people to climb in a safe manner.

DESCRIPTION ON ATTACHED DRAWINGS

[0010] Attached drawings are as the following:

Fig.1 is the principle view of the current invention, a rope ladder with supporting attachments;
Fig.2 is the right-side view of the current invention, a rope ladder with supporting attachments;
Fig.3 is a partial exploded view of said ladder hook 1;
Fig.4 is a partial exploded view of said supporting attachments.

[0011] Description about the current invention in more details is given in the following in combination of the attachment drawings and the preferred embodiment.

PREFERRED EMBODIMENT

[0012] As shown in Fig.1 and Fig.2, the current invention of a rope ladder with supporting attachments comprises a ladder hook 1 that is to be hanged on building, a rope ladder body made of a left and a right ladder belt 2 fixed onto the ladder hook 1, multiple rungs 3 spanning the two ladder belts 2, and supporting attachments 4 symmetrically located on the back of said two ladder belts 2. Said supporting attachments 4 are assembled onto joints of said ladder belts 2 with rungs 3.

[0013] As shown in Fig.4, said supporting attachment 4 is made of metallic material in a folding design, which comprises a base strip 41 that is riveted to the joint of said rung 3 and ladder belts 2, and a supporting strip 42 that is connected to said base strip 41 by way of a pivot

pin 43. And said pivot pin 43 is inside a torsion spring 44, torsion force of which forces said supporting strip 42 to open outward automatically until its bottom inner projection 421 contacts with two bosses 411 in said base strip 41. The inner angle between the opened supporting strip 42 and said rung 3 is a little bit larger than 90 degrees, which makes the supporting strip 42 difficult to close once it is subject to force while providing the maximum space for people to step on said rungs.

[0014] As shown in Fig.3, said ladder hook 1 comprises a U-shaped hook body 11 and two L-shaped hooks12, being one left and one right, formed by the first horizontal bar 121 and the vertical bar 122. Said U-shaped hook body 11 has the second horizontal bar 111 at each of its vertical bar tops, pointing to the back. Two bolts 123 are fixed to inside of the first vertical bar 121 in each said left and right hook 12. And a row of through holes 112 is set up in the second horizontal bars 111 in said hook body 11 on top of both its vertical bars for adjustment of the front-back width of said ladder hook 1. Said two bolts in the first horizontal bars 121 of the left and right hooks 12 will be inserted respectively into any a pair of holes 112 in the second horizontal bars 111 in the hook body 11 to be fixed by the butterfly nuts 13. In this way, width of ladder hook 1 can be adjusted in accordance with thickness of building walls or any other structures to which the ladder is to be hanged. The butterfly nuts are easy to be manually tightened without any tool.

[0015] The supporting attachments 4 can be either assembled onto each joint of said ladder belt 2 with rung 3, or assembled one pair per three or four rungs.

[0016] Said rung 3 is made of aluminum alloy strip inside, which is round in cross-section between the two ladder belts 2, being light but strong in strength. When people climb on the rope ladder, no deformation will occur, thus facilitating climbing. A fire-retardant layer of PP textile bands is wrapped outside the aluminum alloy strip and nylon threads are used to sew together the textile bands in order to enhance friction force.

[0017] When the rope ladder is in use, first adjust width of the ladder hook 1 according to width of the structure in which said hook is to be hanged. Tighten butterfly nut 13 to fix said ladder hook firmly to the structure, then put down the ladder. Said supporting strips 42 in the supporting attachments 4 will open automatically under force of torsion springs 44 to support on building walls or any other structures to which said rope ladder is hanged to make rungs 3 of the ladder at a suitable distance from building walls, facilitating users to step on.

Claims

1. A rope ladder with supporting attachments, comprising a ladder hook (1) for the ladder to be hanged in a building, a rope ladder body fixed to said hook (1) made of a left and a right ladder belt (2) and multiple rungs (3) spanning the two rope ladder belts, is **characterized by**: it also comprises supporting attachments (4) symmetrically fixed on back of the two ladder belts (2), said supporting attachments (4) are assembled at joints of said ladder belts (2) with rungs (3).

2. A rope ladder as defined in claim 1 is **characterized by**: said supporting attachment (4) is of a folding design, comprising a base strip (41) fixed to joint of the rung (3) with belt (2), and a supporting strip (42) that is articulated to said base strip (41) by a pivot pin (43), which is inside a torsion spring (44). Torsion force of such torsion spring (44) will force said supporting strip (42) to open outward automatically until its inner bottom projection (421) is in contact with the position-limiting bosses (411) in the above-mentioned base strip (41). The inner angle between an opened supporting strip (42) and said rung (3) is a little bit larger than 90 degrees.

3. A rope ladder as defined in claim 1 or 2 is **characterized by**: said ladder hook (1) comprises a U-shaped hook body (11) and two L-shaped hooks (12), one left and one right, formed by the first horizontal bars (121) and vertical bars (122), and said U-shaped hook body (11) has second horizontal bars (111) pointing to the back at each of its vertical bar tops. There are two bolts (123) fixed onto each of the first vertical bars (121) of said left and right hook (12) and there is a row of through holes (112) in the second vertical bars (111) at both tops of said hook body (11) for adjusting back-front width of the ladder hook (1). The two bolts at the first vertical bars (12) in said left and right hook (12) will be inserted into through holes (112) in the second horizontal bars (111) of the hook body (11) and tightened by butterfly nuts (13).

4. A rope ladder with supporting attachments as defined in claim 1 or 2 is **characterized by**: at each joint of said ladder belt (2) with rump (3) is assembled with a supporting attachment (4).

5. A rope ladder with supporting attachments as defined in claim 1 or 2 is **characterized by**: a pair of supporting attachments (4) are assembled per three or four rumps (3).

6. A rope ladder with supporting attachments as defined in claim 1 or 2 is **characterized by**: internal of said rump (3) is a aluminum alloy strip with fire-retardant textile band wrapped around.

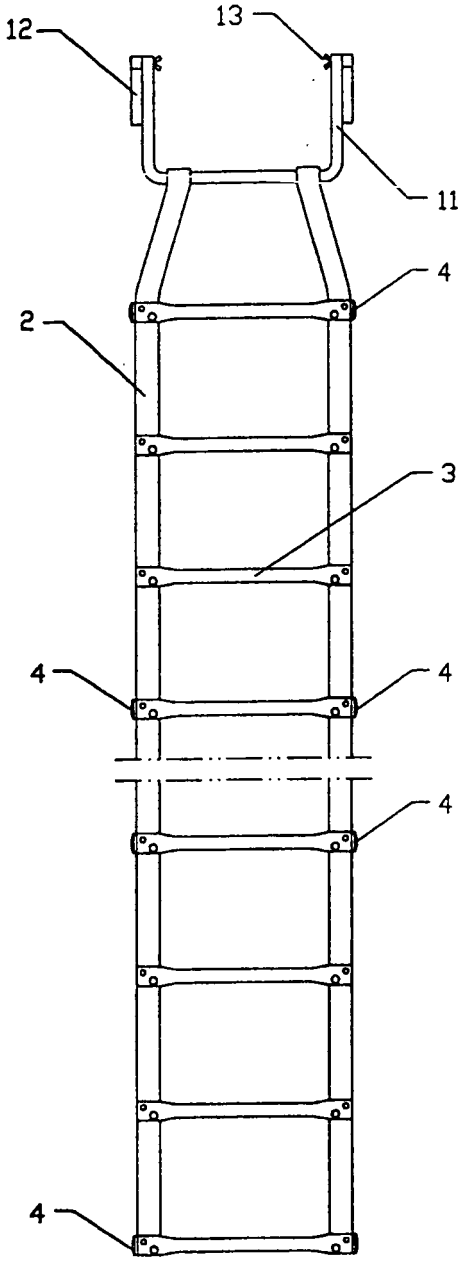

Fig. 1

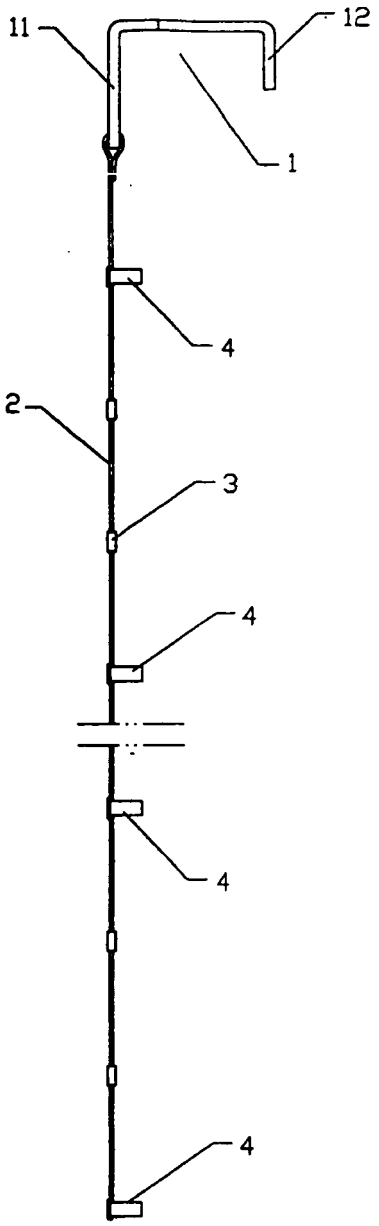

Fig. 2

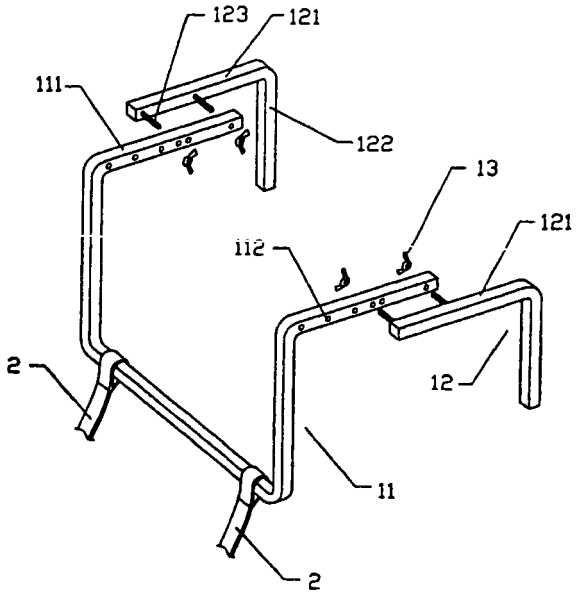

Fig. 3

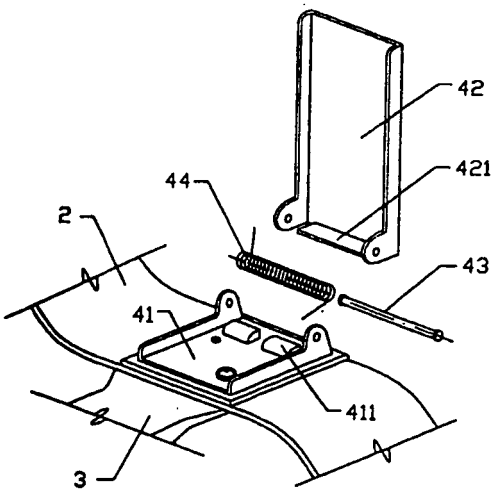

Fig. 4

INTERNATIONAL SEARCH REPORT

International application No.
PCT/CN03/00878

A. CLASSIFICATION OF SUBJECT MATTER

IPC[7] E06C 1/56,E06C 7/48

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC[7] E06C,A62B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

CHINESE PATENT DOCUMENT (1985-),CHINA NATIONAL KNOWLEDGE INFRASTRUCTURE(1994-)

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPODOC,PAJ,WPI

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	CN, Y ,2221620 (NANHAI CITY LISHUIHUADA MOLD MANUFA)06.March,1996 Page4,Fig.2	1,4,5
Y		6
Y	CN, Y ,2381761 (ZHANG,Xibin)07.June 2000 Claims,Fig3	6
A	WO, A1,96/32564 (CHRISTENSEN, Lane,J) 17.October 1996 Page14 Line13—24,Page15—16,Fig 2A, 2B	1,5
A	DE, A1,19638704 (LUCKEY,B) 02.April 1998 the whole document	1-6

☐ Further documents are listed in the continuation of Box C. ☒ See patent family annex.

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"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
08.May 2004	27 · MAY 2004 (27 · 05 · 2004)
Name and mailing address of the ISA/CN 6 Xitucheng Rd., Jimen Bridge, Haidian District, 100088 Beijing, China Facsimile No. 86-10-62019451	Authorized officer 印谢伟 Xie wei Telephone No. 86-10-62085021

Form PCT/ISA /210 (second sheet) (July 1998)

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/CN03/00878

Patent document cited In search report	Publication date	Patent family members	Publication date
CN,Y,2221620	06.March 1996	None	
CN,Y,2381761	07.June 2000	None	
WO,A1,96/32564	17.Octorber 1996	AU5388296A	30. Octorber 1996
DE,A1,19638704	02.April 1998	None	

Form PCT/ISA /210 (patent family annex) (July 1998)